

REMARKS

In reply to the Office action of March 25, 2008, Applicants have amended claim 1, canceled claim 5, and added new claims 15-23. Accordingly, claims 1-4 and 6-23 are pending, with claims 1 and 17 in independent form.

Claims 1-14 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. The Examiner objected to the broad recitation of “an LED light source” in claim 1, in combination with the narrower limitation “particularly comprising mixed-color LEDs.” In this reply, Applicants have amended claim 1 to eliminate the narrower limitation above, and have instead included the narrow limitation in a new dependent claim 15. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. § 112, second paragraph.

Moreover, claims 2-14 depend from claim 1, and are therefore patentable for at least the same reasons. Accordingly, reconsideration and withdrawal of the rejection of claims 2-14 under 35 U.S.C. § 112, second paragraph, is also respectfully requested.

Claims 2-4 also stand separately rejected under 35 U.S.C. § 112, second paragraph, as allegedly being further indefinite for a different reason. The Examiner objected to the limitation “said luminescence conversion material comprises a radioparent matrix material that is replaced with a phosphor” in claim 2. In this reply, Applicants have amended claim 2 in accordance with the Examiner’s suggestion on page 3 of the Office action. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claim 2 under 35 U.S.C. § 112, second paragraph.

Claims 3 and 4 depend from claim 2, and are therefore patentable for at least the same reasons. Therefore, reconsideration and withdrawal of the rejection of claims 3 and 4 under 35 U.S.C. § 112, second paragraph, is also respectfully requested.

Claims 1-8 and 10-11 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Tatsunori et al. (JP 2002-118293, “Tatsunori”). Without conceding the merits of this rejection, but to expedite prosecution, Applicants have amended claim 1 to cover methods for producing LED light sources that include “partially coating said chip with a luminescence

conversion material so that at least a portion of the electrically conductive material is not coated with the conversion material.”

Tatsunori does not disclose such methods. To the contrary, Tatsunori’s methods include complete encapsulation of the upper surface of his chips – including any electrically conductive material thereon – with a translucent mold member 9 that includes fluorescent material (see, e.g., Tatsunori, par. 0058, and Figures 3(a) through 3(c)). As shown in Tatsunori, following encapsulation by the translucent mold member, the entire package can be modified (e.g., by grinding) to a desired profile and/or color tone (id.).

Applicants have been unable to find any disclosure or suggestion in Tatsunori that relates to “partially coating said chip with a luminescence conversion material so that at least a portion of the electrically conductive material is not coated with the conversion material,” as required by amended claim 1. To the contrary, Tatsunori suggests, for example, that incomplete coating of the electrically conductive material can lead to moisture absorption at the interface between the electrically conductive material and the translucent mold member 9 (see, e.g., Tatsunori, par. 0059).

Accordingly, Applicants submit that Tatsunori neither discloses nor suggests the methods covered by amended claim 1, and respectfully request reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. § 102(b).

Claims 2-4, 6-8, and 10-11 depend from amended claim 1, and are therefore patentable over Tatsunori for at least the same reasons. Therefore, Applicants further request reconsideration and withdrawal of the rejection of these claims under 35 U.S.C. § 102(b).

Claims 1-4 and 6-8 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Maeda et al. (U.S. Patent Application Publication No. US 2002/0028527, “Maeda”). Without conceding the merits of this rejection, but to expedite prosecution, Applicants have amended claim 1 to cover methods for producing LED light sources that include “preparing a chip comprising a front-side electrical contact in the form of an electrical contact surface, the front-side electrical contact being positioned on a principal radiation emitting surface of the LED light source.”

Maeda does not disclose such methods. To the contrary, in Maeda's devices, the front-side electrical contact (e.g., electrodes 17 and/or 18 in Figure 5 of Maeda) are positioned on the side of Maeda's chip that is *opposite* to the principal radiation emitting surface. Maeda states that "the light-emitting face of the substrate for the light-emitting element [is positioned] on the opposite side to its circuitry side" (Maeda, par. 0018). Maeda further notes that "the LED substrate 10 is made of transparent sapphire and the emission is allowed to pass through the substrate side ... [t]hus, compared to the prior art LED 110 where the emission is supposed to pass through its circuitry side, a higher luminous efficiency is attainable because the emission is not blocked by the electrodes" (Maeda, par. 0087).

In other words, there does not appear to be any disclosure in Maeda that relates to "preparing a chip comprising a front-side electrical contact in the form of an electrical contact surface, the front-side electrical contact being positioned on a principal radiation emitting surface of the LED light source," as required by amended claim 1. Moreover, Maeda appears to expressly teach away from such a method, citing the advantages of greater luminous efficiency which arise from his flip-chip mounting configuration.

Accordingly, Applicants submit that Maeda neither discloses nor suggests the methods covered by amended claim 1, and respectfully request reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. § 102(b).

Claims 2-4 and 6-8 depend from amended claim 1, and are therefore patentable over Maeda for at least the same reasons. Therefore, Applicants further request reconsideration and withdrawal of the rejection of these claims under 35 U.S.C. § 102(b).

Claim 9 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Maeda in view of Inoue et al. (U.S. Patent Application Publication No. US 2002/0081773, "Inoue"). Applicants note that claim 9 depends from claim 1, which is patentable over Maeda as explained above.

Inoue does not cure the deficiencies of Maeda with respect to claim 1. Inoue apparently discloses various embodiments of his light-emitting devices. In some embodiments (see, e.g., Fig. 3 of Inoue) the LED element is mounted in a flip-chip configuration, as in Maeda. In other

embodiments, the LED element is mounted in a conventional configuration (see, e.g., Fig. 6B of Inoue).

Given the advantages of the flip-chip arrangement that Maeda cites, a person of skill the art would find no reason – based on Inoue or any other reference – to modify Maeda’s devices to include non-flip-chip diode mountings. Any proposed combination of Inoue and Maeda would therefore retain the flip-chip arrangement of Maeda. As explained above, however, such a combination fails to disclose “preparing a chip comprising a front-side electrical contact in the form of an electrical contact surface, the front-side electrical contact being positioned on a principal radiation emitting surface of the LED light source,” as required by amended claim 1. Accordingly, even if Maeda and Inoue are combined in the suggested manner – which Applicants do not concede – the combination still would not disclose or suggest the methods covered by claim 1.

Therefore, Applicants submit that claim 1 is patentable over both Maeda and Inoue, alone or in combination. Further, claim 9 is patentable over both Maeda and Inoue for at least the same reasons as claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claim 9 under 35 U.S.C. § 103(a).

Claim 12 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tatsunori in view of Kumar et al. (U.S. Patent Application Publication No. US 2003/0077878, “Kumar”). Claim 13 stands under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tatsunori in view of Inoue. Without addressing the merits of these proposed combinations of references, Applicants note that each of claims 12 and 13 depends from claim 1, which is patentable over Tatsunori as explained above.

Neither Kumar nor Inoue cures the deficiencies of Tatsunori with respect to claim 1, at least because neither Kumar nor Inoue discloses “partially coating said chip with a luminescence conversion material so that at least a portion of the electrically conductive material is not coated with the conversion material,” as required by amended claim 1. In fact, Applicants have been unable to find any disclosure in either Kumar or Inoue that relates to a luminescence conversion material.

Accordingly, Applicants submit that claim 1 is patentable over Tatsunori, Kumar, and Inoue. Further, each of claims 12 and 13 is therefore also patentable over Tatsunori, Kumar, and Inoue for at least the same reasons as claim 1. Applicants therefore respectfully request reconsideration and withdrawal of the rejections of claims 12 and 13 under 35 U.S.C. § 103(a).

Claim 14 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tatsunori in view of Inoue and Maeda. Without addressing the merits of this proposed combination of references, Applicants note that claim 14 depends from claim 1. As explained previously, claim 1 is patentable over each of Tatsunori, Maeda, and Inoue. Claim 14 is also therefore patentable over Tatsunori, Maeda, and Inoue, for at least the same reasons as claim 1. Applicants therefore respectfully request reconsideration and withdrawal of the rejection of claim 14 under 35 U.S.C. § 103(a).

New claims 15-23 have been added in this reply. Claim 15 depends from claim 1 and covers methods where the “LED light source is a mixed color LED.” Support for the subject matter of claim 15 is found, for example, in previous claim 1.

Claim 16 depends from claim 1 and covers methods where “a maximum height of the luminescence conversion material above the principal radiation emitting surface is less than a maximum height of the electrically conductive material above the principal radiation emitting surface.” Support for the subject matter of claim 16 is found, for example, in the specification at page 9, lines 11-13, and in Figures 3A and 3B.

Claims 15 and 16 are patentable over Tatsunori, Maeda, Inoue, and Kumar for at least the same reasons as claim 1. Accordingly, allowance of claims 15 and 16 is respectfully requested.

Claim 17 covers methods for producing light sources where “prior to coating the chips with the luminescence conversion material, the wafer composite is mounted on a carrier material and the chips are at least partially singulated so that the chips remain attached to the wafer composite on the carrier material.” The subject matter of claim 17 is supported, for example, in the specification at: page 8, line 15, through page 9, line 3; Figures 1A-1F and 2A-2B; and in previous claims 1, 10, and 12. Neither Tatsunori nor Maeda discloses singulating chips in a wafer composite.

The action generally relies on Kumar (see Action at page 8) to provide the disclosure missing from Tatsunori relating to singulation of Tatsunori's multiple chips. However, Applicants submit that a person of skill in the art would not have found any reason to modify Tatsunori to use Kumar's singulating methods, for at least the following reasons.

Kumar's methods are directed to the singulation of silicon chips. Kumar states that "any plasma etch chamber capable of etching silicon may be used" (Kumar, par. 0020). However, silicon is generally not used to form radiation-emitting chips, as silicon does not have a direct bandgap. Instead, radiation-emitting chips are more typically formed from materials such as gallium arsenide and other semiconductor materials. For example, Tatsunori discloses the use of nitride -based chips (see, e.g., Tatsunori, par. 0002).

Applicants have been unable to find any disclosure in Kumar relating to etching of semiconductors other than silicon. Further, Applicants note that based on Kumar's disclosure, his etching methods are apparently specific to certain types of materials. For example, Kumar states that "[i]f the adhesive is used as an etch stop, then the silicon carrier may be spared from etching ... [w]hen using a glass or metal carrier wafer 300 the etchant will not etch the carrier wafer" (Kumar, par. 0022). In other words, certain materials are apparently effectively etched by Kumar's methods, and other materials are not. In the absence of any disclosure in Kumar relating to etching of materials other than silicon, one of skill in the art would have found no reason to apply Kumar's methods to the singulation of Tatsunori's chips, as the outcome of such a process would have been uncertain given the apparently selectivity of Kumar's methods.

Claim 17 requires that "prior to coating the chips with the luminescence conversion material, the wafer composite is mounted on a carrier material and the chips are at least partially singulated." The action states that it would have been obvious to use Kumar's method to singulate Tatsunori's chips and to "perform the coating step after the step of singulating the wafer on the wafer carrier in order to simplify the wafer singulating step without need to singulate the coating" (Action at page 8). Applicants respectfully disagree.

As explained above, Tatsunori's method – as exemplified in Figures 3(a)-3(e) of Tatsunori – apparently includes fully encapsulating Tatsunori's light-emitting device as shown,

for example, in Figure 3(c) of Tatsunori. Therefore, Applicants believe that the wafer singulating step would not be simplified, as the action states, because trenches formed between Tatsunori's chips would be filled with coating material. As a result, following the coating step, the final singulation of Tatsunori's wafers using Kumar's plasma etching methods may even be more complicated, because the singulating step would have to slice through the applied coating material. Moreover, as discussed above, it is not at all clear whether Kumar's plasma etching methods could even be used to etch Tatsunori's translucent mold member 9, as it is apparent from Kumar's disclosure that certain materials can function as etch stop layers.

Given these uncertainties, one of skill in the art would have had no reason to use Kumar's silicon chip singulating method with Tatsunori's light-emitting devices. Applicants submit that, for all of the foregoing reasons, claim 17 is patentable over Tatsunori and Kumar, and respectfully request that claim 17 be allowed.

Claim 18 covers methods that include "completing singulation of the plurality of chips from the wafer composite to form a plurality of separated LED light sources." Claim 19 covers methods where "the electrically conductive material is applied to each member of the plurality of light emitting chips at the same time, and the luminescence conversion material is applied to each member of the plurality of light emitting chips at the same time." The subject matter of claims 18 and 19 is supported, for example, in the specification at: page 8, line 15, through page 9, line 3; Figures 1A-1F and 2A-2B; and in previous claims 1, 10, and 12.

Each of claims 18 and 19 depends from claim 17, and is therefore patentable for at least the same reasons. Accordingly, allowance of claims 18 and 19 is respectfully requested.

Claim 20 covers methods where "the carrier material comprises an adhesive film and/or a stretch film." Claim 21 covers methods where "the carrier material comprises a stretch film, the method further comprising, prior to coating of the chips with the luminescent material, stretching the film to increasing spacings between at least some of the chips." Claim 22 covers methods where "coating each of the chips with the luminescence conversion material comprises at least partially filling spaces between each of the chips on the stretched film with the luminescence conversion material." Claim 23 covers methods where "coating each of the chips with the

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luminescence conversion material comprises completely filling spaces between each of the chips on the stretched film with the luminescence conversion material." Support for the subject matter of each of claims 20-23 is found, for example, in the specification at page 9, lines 5-9.

Applicants have not been able to find any disclosure in Tatsunori, Maeda, Inoue, or Kumar relating to stretch films. Accordingly, Applicants believe that each of claims 20-23 is patentable, and respectfully request allowance of each of claims 20-23.

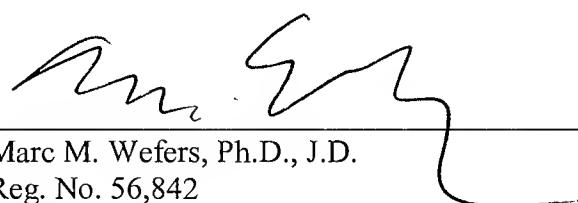
In view of the foregoing, Applicants ask that the application be allowed.

Canceled claims, if any, have been canceled without prejudice or disclaimer. Any circumstance in which Applicants have: (a) addressed certain comments of the Examiner does not mean that Applicants concede other comments of the Examiner; (b) made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims; or (c) amended or canceled a claim does not mean that Applicants concede any of the Examiner's positions with respect to that claim or other claims.

Fees for the Petition for Extension of Time are being paid concurrently on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any other charges or credits to Deposit Account 06-1050, referencing 12406-0112US1.

Respectfully submitted,

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